Freezer Service Manual

i.Series™ and Horizon Series™

	i.Series	Horizon Series	International i.Series	International Horizon Series
Plasma Storage *	**iPF**	**HPF**	**iHPF**	**HHPF**
Laboratory ^	**iLF**	**HLF**		

***** Applies to freezer models 120-4, 120-8, 125-4, and 125-8
^ Applies to freezer models 120 and 125

Model _____
S/N _____

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About this manual

Welcome to the Freezer Service Manual. This section explains the symbols and conventions used in this manual, copyright information about this document, and trademark information for products supplied by Helmer.

Intended audience

This manual is intended for use by qualified service technicians. This manual is to be used in conjunction with the Freezer Operation Manual and the Chart Recorder Operation Manual.

Symbols and conventions

Several symbols and conventions are used in this manual.

Cautions

A Caution is used to call attention to a condition or possible situation that could damage or destroy the equipment or the operator's work.

Cautions are identified as follows:

CAUTION	This is a sample of a CAUTION: Temperature probes are fragile. Handle them with care.

Notes

Notes contain additional information about a topic. Notes are used to provide information about how a topic relates to another topic, or background information about a design characteristic.

Notes are identified as follows:

NOTE	This is a sample of a NOTE: Spare parts are available for purchase through Helmer.

Model references

Generic references are used throughout this manual to group models that contain similar features. For example, "HPF" refers to all models in the Horizon Series (HPF120-4, HPF120-8, HPF125-4, HPF125-8), while "125 models" refers to all models of that size (iPF125-4, iPF125-8, HPF125-4, HPF125-8,, iHPF125-4, iHPF125-8, HHPF125-4, HHPF125-8, iLF125, HLF125). If a feature or procedure applies to a specific model or a specific voltage, it is stated as such.

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1 Working safely

This section describes general safety information for servicing the freezer. The Freezer Operation Manual includes additional safety information for operating and cleaning the freezer. Your organization may provide additional safety information.

1.1 General safety

To avoid injury to yourself and the freezer, follow these safety instructions:

- ► Never attempt to physically restrict any of the moving parts.
- ► Before performing the procedures in this manual, review the specific safety instructions for them.
- ► Before using tools, materials, and equipment to perform procedures in this manual, review the manufacturer's safety instructions for them.
- ► Perform only the maintenance described in this manual. Maintenance other than that specified in this manual should only be performed by technical service representatives authorized by Helmer.

1.2 Electrical safety

CAUTION The freezer has the potential of being a shock hazard. Review all safety instructions.

Review the following safety instructions before troubleshooting, repairing, or replacing parts in the freezer:

- ► Before removing covers from the freezer, disconnect the power to the freezer.
- ► Use appropriate grounding precautions when replacing circuit boards and other electrical parts.
- ► Use power cords and other electrical parts that are designed for use with the freezer.

1.3 Chemical and biological safety

Review the safety instructions in the Freezer Operation Manual before using, cleaning, or servicing the freezer:

CAUTION

- ► In addition to the instructions included in this manual, follow all chemical handling and disposal requirements and procedures specified by your organization.
- ► Before sending parts to Helmer or your distributor for service or repair, decontaminate them as appropriate. Any items that have not been decontaminated appropriately will not be accepted. Documentation stating that the contents are not contaminated and are safe to handle must accompany all returns. Contact Helmer or your distributor for decontamination instructions and a return authorization number.

2 Reviewing information about the freezer

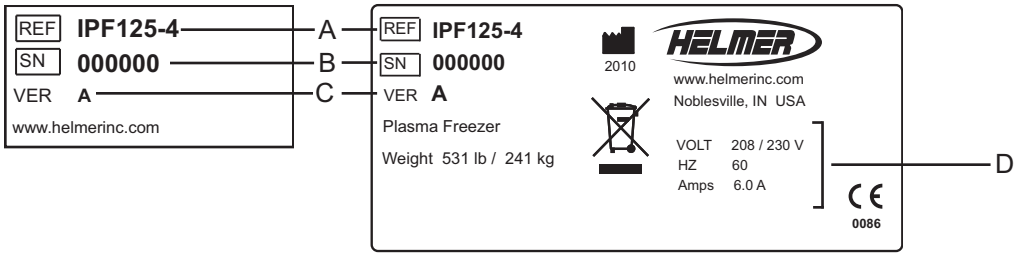
Each Helmer freezer has unique features that affect how it is serviced. Some features are based on the model, while others are based on options selected at the time of order.

This section explains how to find identification information about the freezer, and how to determine which features apply to a particular model.

2.1 Finding model and input power information

Service information varies depending on the model and input power requirements.

This information appears on the Product Specification label, located on the rear of the freezer below the electrical box. The model also appears on a label located in the chamber on the upper side of the left wall.



Sample product identification labels. Left: Label (located in the chamber). Right: Product Specification label (located on the rear).

Label	Description
A	Model
B	Serial number (S/N)
C	Version
D	Power requirements

2.2 Identifying the control system

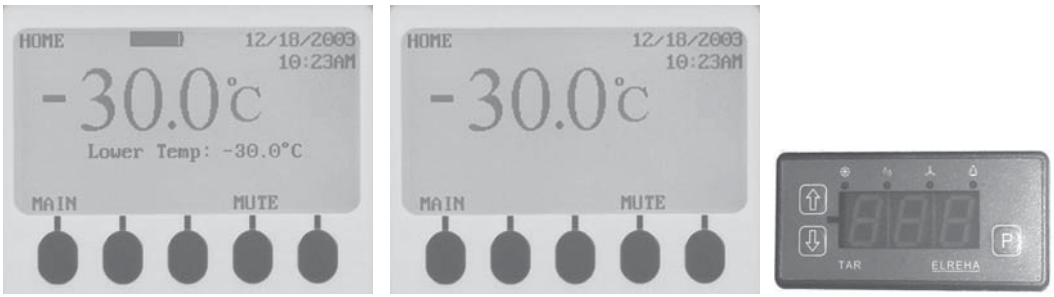
Service information varies depending on the control system.

Helmer freezers have one of three control systems installed. The type of control system varies by model.

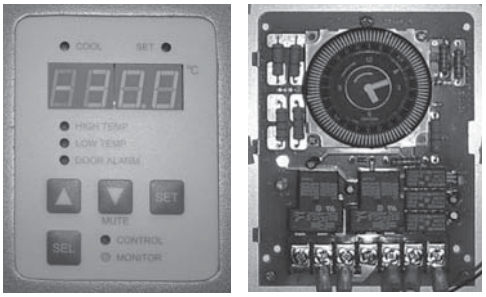
i.Center. This system has a monitor that is independent from the temperature controller. The monitor, which is located on the front of the freezer over the door, displays operational information. The temperature/defrost controller, which is located inside the electrical box on the rear of the freezer, controls the temperature of the chamber.

Horizon. This system is a limited-feature model of the i.Center. Unlike the i.Center monitor, the Horizon monitor does not have a battery charge level indicator or a Lower Temp display. The temperature/defrost controller is the same as that used with the i.Center system.

Laboratory. This system has a combined monitor and temperature controller. This system both controls the temperature of the chamber and monitors and displays operational information. The user interface for this system is located on the front of the freezer over the door.



i.Center and Horizon independent monitoring and control system parts.
Left: i.Center display. Middle: Horizon display. Right: Temperature/defrost controller.



Laboratory combined monitoring and control system parts. Left: Laboratory display.
Right: Defrost control.

Model group	Control system
iPF, iLF, iHPF	i.Center independent monitoring and control system
HPF	Horizon independent monitoring and control system
HHPF, HLF	Laboratory combined monitoring and control system

2.3 Temperature controller values

2.3.1 Laboratory models

The following parameters comprise temperature controller program values for Helmer laboratory freezers.

Above: Laboratory display.

High Alarm

The High Alarm setpoint specifies the temperature at which the high temperature alarm should activate. If the temperature detected by the upper chamber probe is greater than or equal to this value, the alarm activates. The factory default High Alarm setpoint is -20.0 °C. The setpoint may be changed to a value from -40.0 °C to +40.0 °C.

Low Alarm

The Low Temp alarm setpoint is not used in Helmer freezer operations. The default Low Alarm setpoint is factory pre-set at -40.0 °C, and this value should not be changed.

Control Temperature Offset Value

The Control Offset is used to control the temperature of the chamber while the refrigerator is in use. This value is factory preset and should not be changed. However, if it is necessary to adjust the temperature of the chamber, use the procedures found in the Freezer Operation manual, Section 5.3 “Changing Settings.”

Monitor Temperature Offset Value

The Monitor Offset is used to calibrate the displayed temperature with the measured temperature when the temperature displayed on the monitor does not match the actual chamber temperature. The default value varies for each freezer. The monitor offset may be changed to a value from -10.0 °C to +10.0 °C. Refer to the Freezer Operation manual, Section 5.3.2, “Calibrating the monitor readout” for additional information.

Hysteresis

The hysteresis value for Helmer laboratory freezers is 2.0. This value should not be changed.

2.3.2 i.Series models

2.3.2.1 Changing the freezer setpoint on the independent temperature controller

The freezer setpoint is controlled by setting parameter P03 on the temperature/defrost controller. The temperature/defrost controller is located inside the lower front panel of the undercounter freezer.

Temperature/defrost controller display and buttons

To change the freezer setpoint

CAUTION: Do not change the freezer setpoint to a value outside the temperature control range. For more information, see Section 9.3.4, “Operating conditions.”

NOTE: If values are changed, and no buttons are pressed for approximately 4 minutes prior to saving, the display returns to normal operating mode. Any changes made are discarded.

1. Determine what the normal temperature for the chamber should be. The factory has determined the normal temperature to be -30.0 °C, but it may be different for your organization.
2. Determine how much the freezer setpoint needs to be changed to reach the desired normal temperature. For example, if the desired normal temperature is -30.0 °C, but the current setpoint is -29.0 °C, then the setpoint would need to be adjusted -1.0 °C.
3. On the temperature/defrost controller, access the parameter menu by pressing the P button. The display shows PXX where XX is a parameter number.
4. Adjust the freezer setpoint (Parameter P03).
   a. Press the up or down arrow button until P03 appears.
   b. Press the P button. The display shows the current temperature in Celsius (°C).
   c. Press the up and down buttons to adjust the setting.
      - ► Press and release the up button once to increase by 0.1 °C.
      - ► Press and release the down button once to decrease by 0.1 °C.
   d. When finished adjusting the setpoint, press the P button. The setpoint is changed and P03 appears on the display.
5. Do one of the following to return to the temperature control probe display (Parameter P01):
   - ► Press the up or down arrow button until P01 appears.
   - ► Do not press any of the buttons for approximately 4 minutes. P01 appears automatically.

2.3.2.2 Hysteresis value

The hysteresis value for the Helmer freezers, i.Series models, is 4.0. This value should not be changed.

3 Maintaining the freezer

This section describes additional maintenance tasks not included in the Freezer Operation Manual.

3.1 Recharging the refrigerant

NOTE The procedures in this section should only be completed by trained refrigeration technicians who are familiar with the terminology and processes described here, as well as with local and organizational regulations regarding refrigerant leaks.

Use only non-CFC R404A refrigerant.

The freezer has an expansion valve refrigeration system. The amount of the full initial charge is 50 oz (1417 g)

The following is needed to recharge the refrigerant:

- ► Refrigerant of the appropriate type and quantity
- ► A calibrated pressure gauge capable of reading 0 lb/in² to 220 lb/in² (0 kPa to 1520 kPa)

To recharge the refrigerant

1. Attach the pressure gauge to the refrigeration lines.
2. Monitor the low side (suction) pressure through a full compressor cycle.
3. At the end of the next cycle, before the compressor stops, measure the pressure. The pressure varies depending on the ambient air temperature. The low side pressure should be 4 lb/in² to 7 lb/in² (30 kPa to 50 kPa), while the high side pressure should be 100 lb/in² to 220 lb/in² (690 kPa to 1520 kPa). If the pressure is not within these ranges, there may be a different problem with the refrigeration system. Refer to Section 4, “Troubleshooting” for additional information, or call Helmer Technical Service, or your local distributor.

4 Troubleshooting

Before taking actions as described in this section, make sure operational issues have been addressed as described in the Freezer Operation Manual.

This section describes some problems that may be experienced, explains possible causes, and provides some corrective actions.

CAUTION Review all safety instructions prior to completing troubleshooting recommendations. For more information, see Section 1, "Working safely."

4.1 Troubleshooting general operation problems

Problem	Possible Cause	Action
A drawer does not slide easily.	A drawer slide is faulty.	► Confirm the slide is operating correctly. Replace if necessary.
The door does not open easily.	There is debris in the hinges.	► Confirm the hinges are free of debris. Clean the hinges if necessary.
	The door hinges are not lubricated.	► Using a general-purpose grease, lubricate the pivots in the hinges.
	A hinge cam is faulty.	► Confirm the hinge cam is not damaged. Replace if necessary.
The display on the temperature/defrost controller is flashing (iPF, HPF, iHPF, and iLF models).	The defrost probe or temperature probe wiring is an open circuit.	► Check the continuity of the probe wiring and connections. Secure the connections if necessary. ► Confirm the probe is providing resistance in the range of 1191 Ω to 2000 Ω. Replace the probe if necessary.

4.2 Troubleshooting chamber temperature problems

Problem	Possible Cause	Action
The chamber temperature displayed is higher or lower than the actual temperature (iPF, HPF, iHPF, and iLF models)	The connections for the chamber temperature probe are loose.	► Test the probe connections. Secure the connections if necessary.
	The temperature probe wiring is an open circuit.	► Check the continuity of the probe wiring. Replace the probe if necessary.
	The probe bottles are empty, or the amount of solution is too low.	► Check the level of product simulation solution in the bottles. Refill the bottles if necessary. For more information, see the Freezer Operation Manual.
"Prob" appears on the display, but the chamber temperature is set correctly (HHPF and HLF models)	The connections for the chamber temperature probe are loose.	► Test the probe connections. Secure the connections if necessary.
	The temperature probe wiring is an open circuit.	► Check the continuity of the probe wiring and connections. Secure the connections or replace the probe if necessary.

continued

Problem	Possible Cause	Action
continued The chamber temperature does not stabilize at the freezer setpoint.	The compressor starting relay is faulty.	► Confirm the relay is operating correctly. Replace the relay if necessary.
	Laboratory control models: The monitor/ control board is faulty i.Center or Horizon control models: the temperature/defrost controller is faulty	► Confirm the monitor/control board or temperature/defrost controller is operating correctly. Replace the board or controller if necessary.
	The compressor fan is not running.	► Check the compressor fan connections. Replace the fan motor if necessary.
	The unit cooler fan is not running.	► Activate the door switch, wait for the fan delay to elapse (about 15 to 30 seconds), then check the voltage to the fan. Replace the fan motor or door switch if necessary.
	The refrigerant level is too low.	► Check the refrigerant level. Recharge the refrigerant if necessary. For instructions, see Section 3.1, “Recharging the refrigerant.”
	The compressor motor has seized.	► Replace the compressor.
	The temperature control probe is faulty.	► Confirm the probe is providing resistance in the range of 1191 Ω to 2000 Ω. Replace the probe if necessary.

4.3 Troubleshooting alarm activation problems

Problem	Possible Cause	Action
The freezer is in an alarm condition, but alarms are not audible.	The alarm system is faulty.	► Confirm the circuit board and line connections are functioning correctly.
	The control board is faulty (iPF, HPF, iHPF, and iLF models)	► Replace parts with those included in the control and display board kit.
	The alarm buzzer is faulty.	► Replace the alarm buzzer.
The freezer meets an alarm condition, but the appropriate alarm is not active.	The control board is faulty (iPF, HPF, iHPF, and iLF models)	► Replace parts with those included in the control and display board kit.
The High Temperature alarm activates when the door is opened, then clears shortly after the door is closed.	The connections for the chamber temperature probe are loose.	► Test the probe connections. Secure the connections if necessary.
	The chamber temperature probe is faulty.	► Test the probe. Replace the probe if necessary.
	The unit cooler fan continues to run while the door is open.	► Test the door switch and unit cooler fan connections. Secure the connections if necessary. Replace the door switch or fan motor if necessary. *continued*

Problem	Possible Cause	Action
continued The freezer is connected to power and turned on, but the AC Power Failure alarm is active.	The outlet connection is faulty.	► Verify power at the outlet. Repair the original outlet or connect to a different outlet if necessary.
	The power cord is faulty.	► Confirm the power cord is connected securely. Secure the power cord if necessary.
	The power supply board is faulty (iPF, HPF, iHPF, and iLF models)	► Replace the power supply board.
The Door Open alarm is activating sporadically.	The door is not closing completely.	► Confirm the hinge cams are not damaged. Replace if necessary.
	The door is closing but not sealing completely.	► Confirm the door gasket seals completely. Replace the door gasket if necessary.
	The connections for the door switch are faulty.	► Test the switch connections. Secure the connections if necessary.
	The door switch is faulty.	► Replace the door switch.
	The control board is faulty (iPF, HPF, iHPF, and iLF models)	► Replace parts with those included in the control and display board kit.
All alarms are activating sporadically.	The alarm system is faulty.	► Confirm the circuit board and line connections are functioning correctly.
	The control board is faulty (iPF, HPF, iHPF, and iLF models)	► Replace parts with those included in the control and display board kit.
The condenser alarm is active (iPF, iHPF, and iLF models)	The refrigerant level is too low.	► Check the refrigerant level. Recharge the refrigerant if necessary. For instructions, see Section 3.1, “Recharging the refrigerant.”
	The connections for the condenser temperature probe are loose.	► Test the probe connections. Secure the connections if necessary.
	The condenser temperature probe is faulty.	► Test the probe. Replace the probe if necessary.
	The condensing unit fan motor is faulty	► Replace the condensing unit fan motor.
	The condenser probe is not calibrated.	► Confirm the condenser probe is reading correctly. Calibrate the probe if necessary.

4.4 Troubleshooting testing problems

Problem	Possible Cause	Action
The automatic temperature tests do not work (iPF, iHPF, and iLF models)	The connections for the upper chamber temperature probe are loose.	► Test the probe connections. Secure the connections if necessary.
	The upper chamber temperature probe is faulty.	► Test the probe. Replace the probe if necessary.
	The control board is faulty (iPF, HPF, iHPF, and iLF models)	► Replace parts with those included in the control and display board kit.

4.5 Troubleshooting condensation and icing problems

Problem	Possible Cause	Action
There is excessive water in the water evaporation tray.	The heater in the evaporation tray is faulty.	► Confirm the heater is hot and is drawing the appropriate current (approximately 0.21 A to 0.35 A). Replace the heater if necessary.
There is excessive ice in the chamber.	Humid air is entering the chamber.	► Confirm the freezer is level, and the doors are aligned, closing tightly, and sealing correctly. Correct issues as necessary.
	The drain port on the unit cooler was damaged during removal of the unit cooler cover.	► Confirm the drain port on the unit cooler is intact. For instructions to remove and install the unit cooler cover, see Section 5.1, “Removing and installing the unit cooler cover.”
	The external fan is faulty.	► Confirm the external drain fan is running. Hold a piece of paper in front of the fan and check that the paper is being drawn toward the freezer. ► Confirm the connections are secure. Tighten the connections if necessary. ► Replace the external drain fan.
There is excessive humidity on the doors.	Humid air is entering the chamber.	► Confirm the freezer is level, and the doors are aligned, closing tightly, and sealing correctly. Correct issues as necessary.
	The relative humidity around the freezer is too high.	► Confirm the freezer is placed appropriately. For more information, see the Freezer Operation Manual.

continued

Problem	Possible Cause	Action
continued After defrosting, no water flows into the water evaporation tray.	The drain line heater is faulty.	► Confirm the connections are secure. Tighten the connections if necessary. ► Confirm the drain line heater is warm to the touch. ► Replace the heater if necessary.
	The defrost heater on the evaporator in the unit cooler is faulty.	► After defrosting the freezer, monitor the evaporator for repeated ice buildup. ► Confirm the connections are secure. Tighten the connections if necessary. ► Confirm the drain line heater is hot and is drawing the appropriate current during a defrost event (approximately 3.9 A to 5.5 A). ► Replace the heater if necessary.

5 Servicing the freezer

This section explains how to access some serviceable parts.

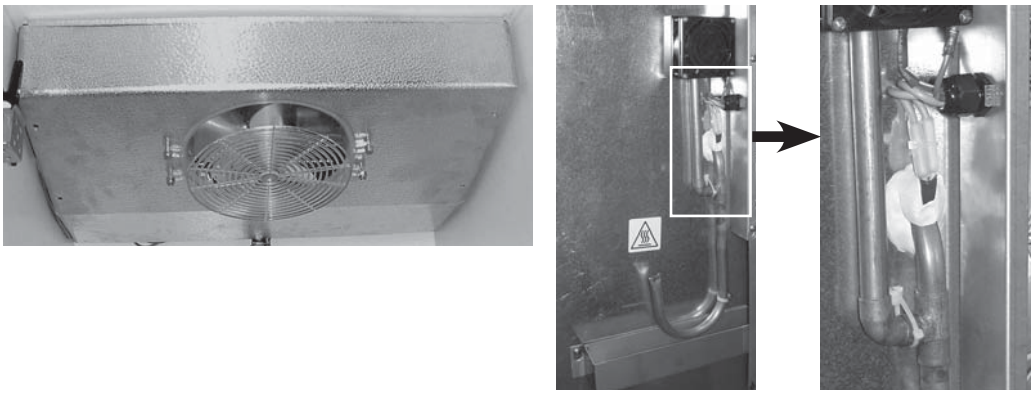
5.1 Removing and installing the unit cooler cover

The unit cooler cover has a drain port for draining condensation from the unit cooler. If the unit cooler cover is not removed correctly, the drain port will be damaged. If the drain port is damaged, condensation will not drain properly and may result in excessive icing in the freezer and may prevent the freezer from maintaining the freezer setpoint.

This drain port fits into a piece of angled copper tubing that directs the condensate into the J-shaped drain line on the rear of the freezer. Before removing the unit cooler cover, first remove the copper tubing. This process also requires the removal of the drain line heater, which is located inside the tubing between the drain port and the electrical box.

The following is needed to remove and install the unit cooler cover:

- 5/16 inch socket wrench
- Flathead screwdriver or equivalent tool to push putty away from the tubing.



Left: Unit cooler cover inside the chamber. Middle and Right: Drain tubing on rear of freezer

To remove the unit cooler cover

1. Turn off the freezer and disconnect it from power. Disable the power failure alarm by removing a backup battery from the holder or turning the alarm key switch to the off position.
2. On the rear, remove the wire ties that secure the drain line to the freezer.

CAUTION The water evaporation tray and condensate evaporator may be hot. Avoid contact with them.

3. Remove the J-shaped tube by pulling it downward to separate it from the other tubing. The tube to the external drain fan may also separate from the fan in the process.
4. Peel the putty away to expose the angled copper tube and the drain line heater that is inserted into the hole in the tube.
5. Remove the wire tie securing the heater wires to the freezer. Verify the black heating element is cool to the touch.
6. Remove the drain line heater from the angled copper tube by firmly pulling the heating element downward and away from the freezer. The heating element is about 9 inches (220 mm) long.

7 For 8-drawer Plasma Storage models, remove the top drawer and the Cold-Shield system panel that is above it from the chamber. To remove the Cold-Shield panel, loosen the three screws that secure it to the freezer (located behind the panel: one in the middle and two on the right side), then slide the panel to free it from the screws.

8 In the chamber, under the unit cooler, push the putty away from the drain port to expose the copper tubing. The putty may be hardened from the cold, so wait until it softens.

9 On the rear, remove the angled copper tube by firmly grasping it and pulling it downward and away from the freezer. Twisting the tube makes it easier to pull. The drain port on the unit cooler is now visible.

10 While holding the unit cooler cover in place to prevent it from dropping, use the socket wrench to remove the four screws securing the cover to the unit cooler. Gently lower the cover to avoid damaging wiring for the unit cooler fan.

To install the unit cooler cover

1 In the chamber, verify the wiring for the unit cooler fan is connected and routed correctly. The wiring should be routed above the copper tube inside the unit cooler. If the wires have separated, reconnect them (the two wires marked with wire ties should be connected to each other).

2 Install the unit cooler fan cover. Lift the unit cooler cover into place, making sure the front of the cover is behind the lip on the unit cooler. Tighten the screws to secure the cover in place. Make sure the screws are tight enough so the unit cooler does not move when bumped. If the unit cooler is not tightly in place, the tubing will be more difficult to install.

3 On the rear, insert the long straight section of the angled copper tube through the hole in the freezer. Push the tube upward at an angle so the end slides over the drain port. When in the proper position, the hole on the copper tube should face outward and be about a half inch (10 mm) from the freezer. In the chamber, the drain port should be completely covered by the tube. If the tube does not align with the drain port, try using putty on the rear of the freezer to hold the tube in place, then adjust the drain port to align with the tube, then finish pushing the tube into position.

4 Install the remaining tubing. Insert the straight section of copper tubing into the hole on the bottom of the external fan. While holding that section in place, press the J-shaped tube upward into place. Fasten the tubing in place with the two wire ties.

5 Install the drain line heater into the drain line. Insert the end of the heater into the hole on the angled copper tube, then push the heater upward at an angle until the black heating element is no longer visible. For easier installation, make sure the heating element is as straight as possible so it does not get obstructed by the end of the drain port.

6 Press the putty around the angled copper tube to seal the hole from the rear. Secure the heater wires to the freezer with a wire tie.

7 In the chamber, press the putty around the copper tube and partially in the hole in the freezer to ensure a tight seal.

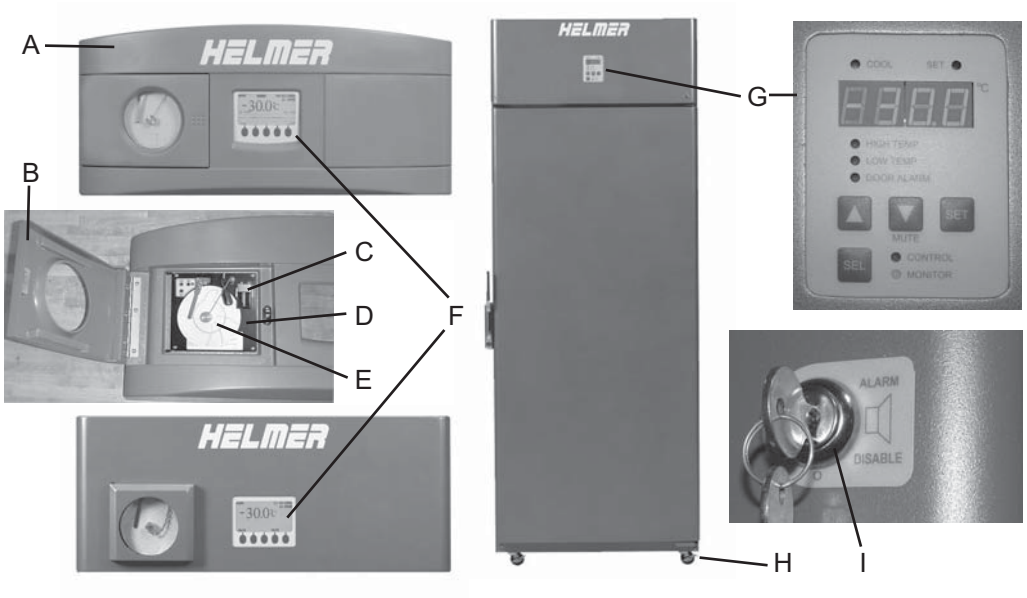
8 Return the freezer to normal operation. Connect power to the freezer, turn on the freezer, and allow it to return to a stable temperature before use.

6 Parts

The Troubleshooting section recommends replacing parts in certain situations. This section shows where to find replaceable parts and lists part numbers for them. It also includes references to the parts on the electrical schematic, as appropriate. See Section 7, “Schematics” for more information.

CAUTION Before replacing parts that directly or indirectly affect the chamber temperature, take precautions to protect items in the freezer from extended exposure to adverse temperatures.

6.1 Parts on the front

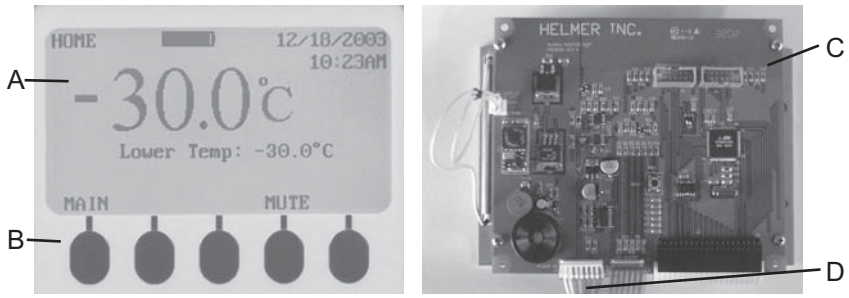


Parts on the front

Label	Description	Replacement part numbers	Label on schematic
A	Bezel with chart recorder door	iPF and iLF models: 400629-1	-
B	Chart recorder door	iPF and iLF models: 400628-1	-
C	Chart recorder backup battery (9 V alkaline, non-rechargeable)	120218	AD
D	Chart recorder	400409-5 (includes manual and battery)	X
E	Chart paper	220419 (package of 52 sheets)	-
F	i.Center and Horizon display	See Section 6.1.1, “i.Center and Horizon control system display parts”	K (i.Center and Horizon)
G	Laboratory display	See Section 6.1.2, “Laboratory control system display parts”	L (Laboratory)
H	Caster (swivel with brake)	220467	-
I	Alarm key switch	Laboratory: 120227	W (Laboratory)

6.1.1 i.Center and Horizon control system display parts

NOTE This section applies to iPF, HPF, iHPF, and iLF models.



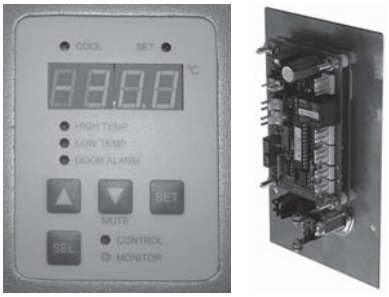
Left: Front view of display assembly showing LCD board and touchpad. Right: Rear view showing display board

Label	Description	Replacement part numbers	Label on schematic
A	LCD board (see note below)	i.Center and Horizon: 120452	K (i.Center and Horizon)
B	Touchpad (see note below)	i.Center and Horizon: 320722-1	K (i.Center and Horizon)
C	Display board	i.Center and Horizon. Included in the control and display board kit.	K (i.Center and Horizon)
D	Interface cable	i.Center and Horizon: 400502-1	AF (i.Center and Horizon)
Not shown	Display assembly	Includes LCD board and touchpad i.Center and Horizon: 400509-1	K (i.Center and Horizon)

NOTE Although the LCD board and touchpad may be replaced individually, Helmer recommends replacing the display assembly.

6.1.2 Laboratory control system display parts

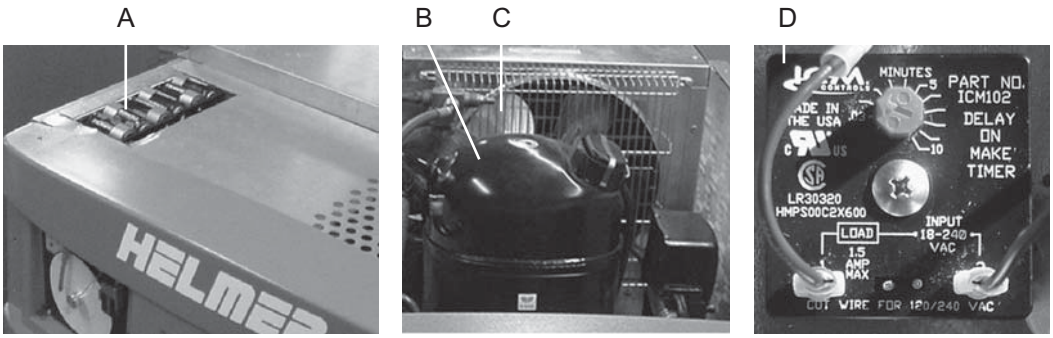
NOTE This section applies to HHPF and HLF models.



Left: Laboratory display with touchpad. Right: Rear view of display showing monitor/control board.

Description	Replacement part numbers	Label on schematic
Monitor/control board (with touchpad)	Laboratory: 120402	L (Laboratory)

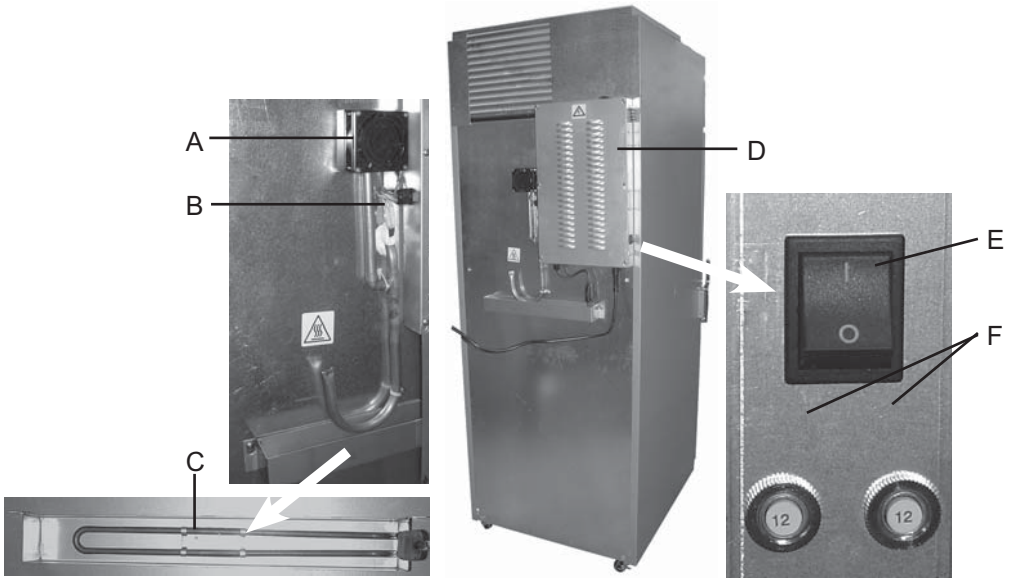
6.2 Parts on the top



Parts on top of freezer. Left: Battery compartment (iPF125-4 model shown). Middle: Compressor (located under service panel). Right: Fan delay relay (located under service panel)

Label	Description	Replacement part numbers	Label on schematic
A	Monitor backup battery (1.5 V D-cell alkaline, non-rechargeable)	i.Center and Horizon: 715031	AE (i.Center and Horizon)
B	Compressor unit	230 V 60 Hz: 400672-2 230 V 50 Hz: 400672-1	A
C	Condensing unit fan motor	230 V 60 Hz: 120493 230 V 50 Hz: 120515	U
D	Fan delay relay	120503	Y
Not shown	Monitor backup battery (9 V lithium, non-rechargeable)	Laboratory: 120399	AE (Laboratory)
Not shown	Condenser probe	i.Center: 400674-1 (probe with connector)	AC (i.Center)

6.3 Parts on the rear

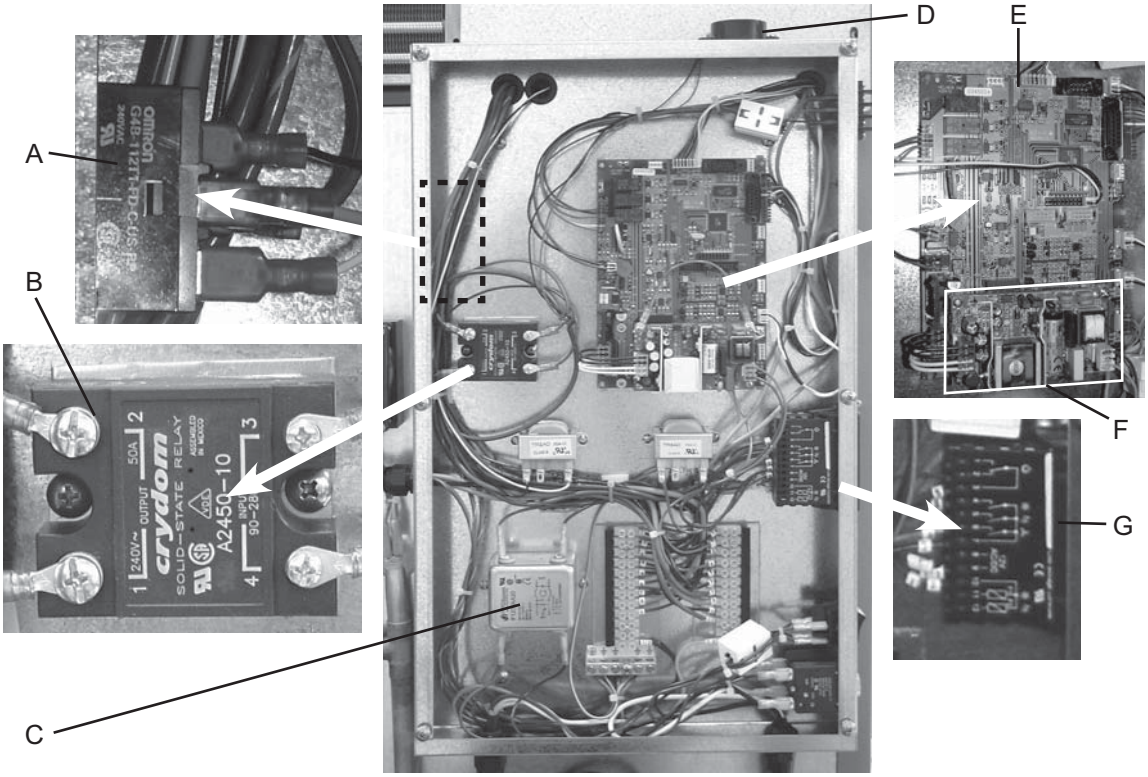


Parts on the rear of the freezer

Label	Description	Replacement part numbers	Label on schematic
A	External drain fan	120511	Z
B	Drain line heater	120485	O
C	Condensate evaporator kit	Includes the condensate evaporator and water evaporation tray. 400790-2	J
D	Electrical box	For part numbers for parts in the electrical box, see the following sections: i.Center and Horizon: Section 6.3.1, “i.Center and Horizon control system electrical box parts” Laboratory: See Section 6.3.2, “Laboratory control system electrical box parts”	-
E	Main power switch	120478	Q
F	Circuit breaker, 12 A	120220	P

6.3.1 i.Center and Horizon control system electrical box parts

NOTE This section applies to iPF, HPF, iHPF, and iLF models.

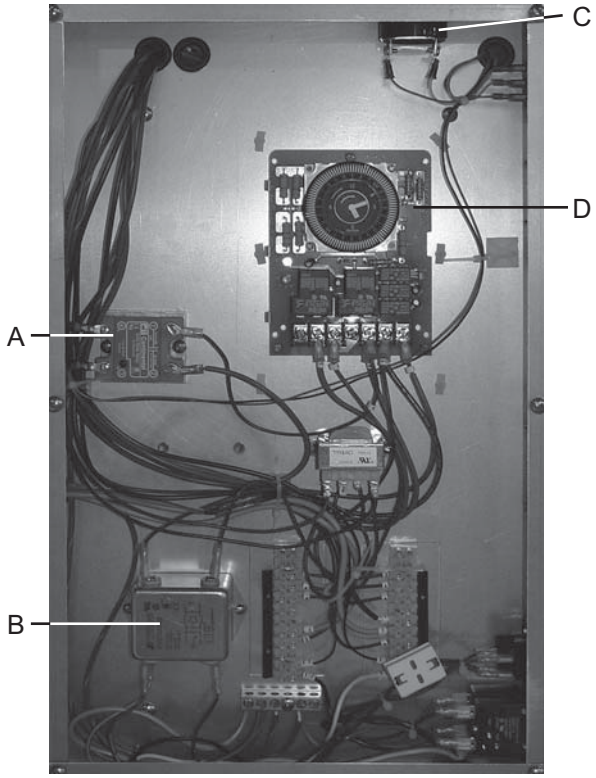


Electrical box parts for models with i.Center and Horizon control systems

Label	Description	Replacement part numbers	Label on schematic
A	Defrost relay	i.Center: 120475	V (i.Center)
B	Compressor relay (50 A)	i.Center and Horizon: 120512	AA (i.Center and Horizon)
C	Power line filter	i.Center and Horizon: 120400	AK (i.Center and Horizon)
D	Alarm buzzer	i.Center and Horizon: 120457	D (i.Center and Horizon)
E	Control board	i.Center and Horizon. Included in the control and display board kit.	E (i.Center and Horizon)
F	Power supply board	i.Center and Horizon: 400633-1	AH (i.Center and Horizon)
G	Temperature/defrost controller (programmed)	i.Center and Horizon: 400540-1	B (i.Center and Horizon)
Not shown	Control and display board kit	Includes the control board, display board, power supply board, and interface cable. i.Center: 400649-1 Horizon: 400649-2	K and E (i.Center and Horizon)

6.3.2 Laboratory control system electrical box parts

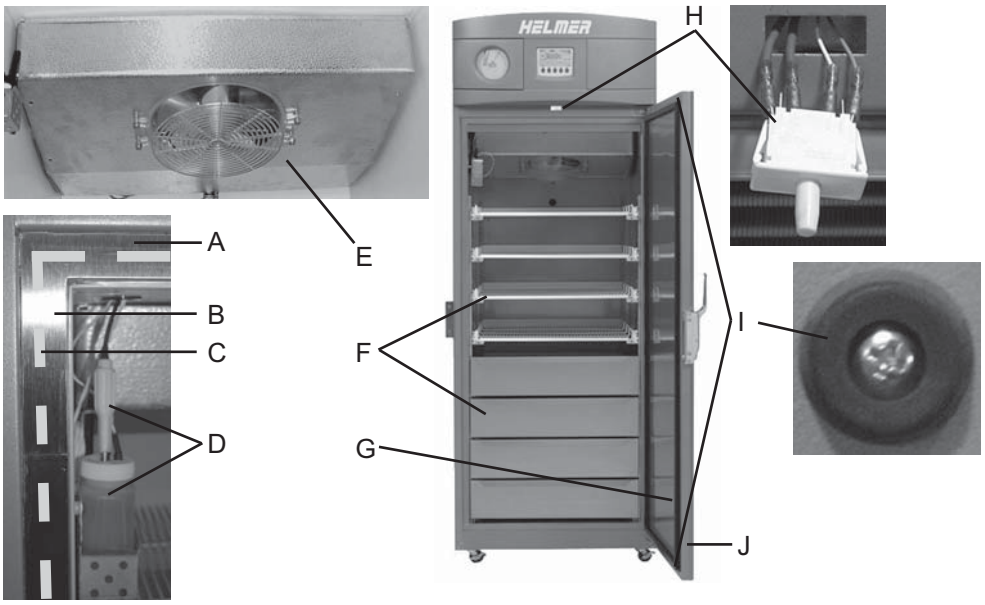
NOTE This section applies to HHPF and HLF models.



Electrical box parts for models with the Laboratory combined monitor/control system

Label	Description	Replacement part numbers	Label on schematic
A	Compressor relay (25 A)	Laboratory: 120426	AA (Laboratory)
B	Power line filter	i.Center and Horizon: 120400	AK (i.Center and Horizon)
C	Alarm buzzer	Laboratory: 120160	D (Laboratory)
D	Defrost controller	Laboratory: 120484	F (Laboratory)

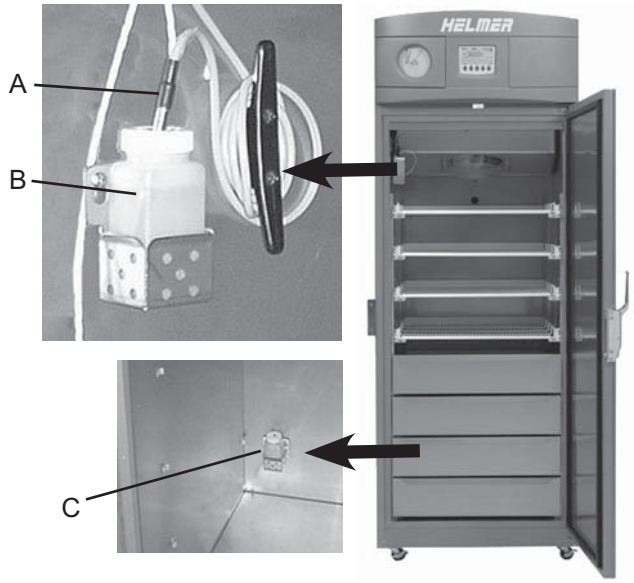
6.4 Interior parts



Interior parts

Label	Description	Replacement part numbers	Label on schematic
A	Horizontal strike plate	320962-2	-
B	Vertical strike plate	320962-1	-
C	Mullion heater	Located under the strike plates 120481	C
D	Chamber probes and bottles	See Section 6.4.1, “Chamber probes and probe bottle parts” for part number information	-
E	Unit cooler	See Section 6.4.2, “Unit cooler parts” for part number information and Section 5.1, “Removing and installing the unit cooler cover” for service information.	AG
F	Storage parts	See Section 6.4.3, “Storage parts” for part number information	-
G	Door gasket	320726-1	-
H	Door switch	120380	I
I	Door bumper	220441	-
J	Door	See Section 6.4.4, “Door and hinge parts” for part number information	-
Not shown	Strike plate replacement kit	Includes strike plates (2 vertical, 2 horizontal), with pre-applied foam tape, foil tape, and replacement instructions 400687-1	-

6.4.1 Chamber probes and probe bottle parts

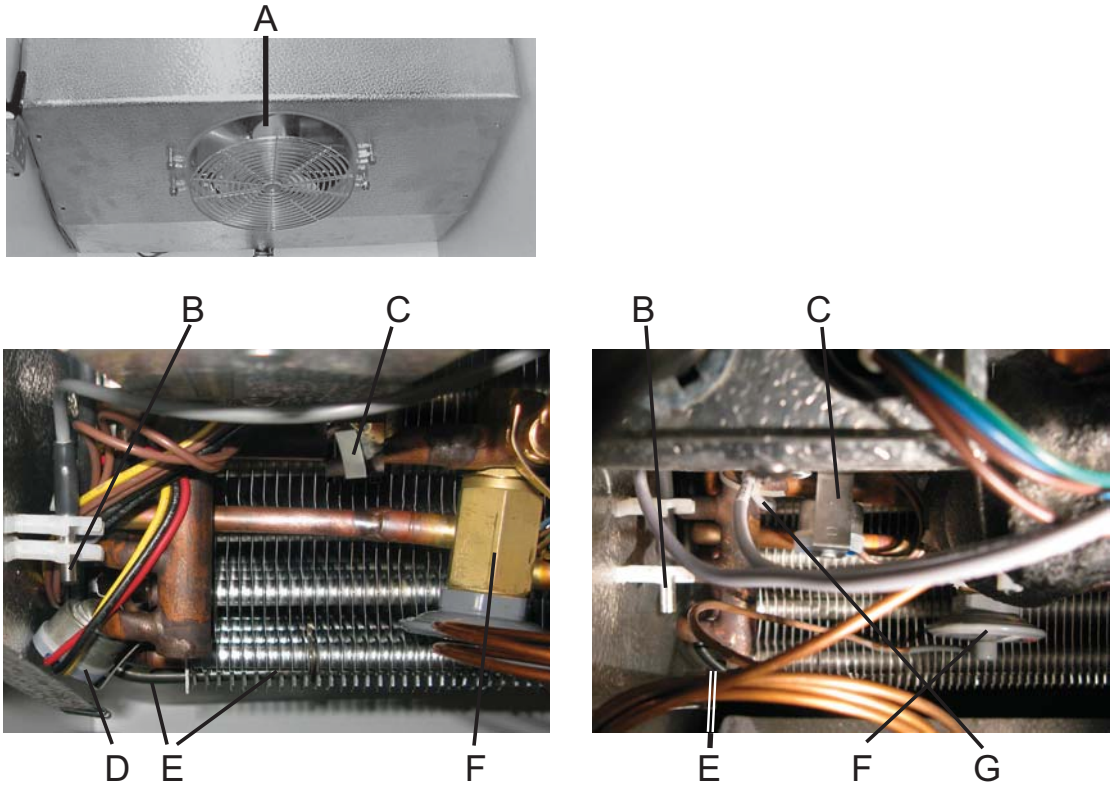


Chamber probes and probe bottle parts

Label	Description	Replacement part numbers	Label on schematic
A	Upper chamber probe	i.Center: 400510-1 (self-test probe with connector) Horizon and Laboratory: 400512-1 (temperature probe with connector	AB
B	Probe bottle	Includes cap 220392	-
C	Lower chamber probe	i.Center: 400513-1	N (i.Center)
Not shown	Chart recorder probe	400855-1	AI

6.4.2 Unit cooler parts

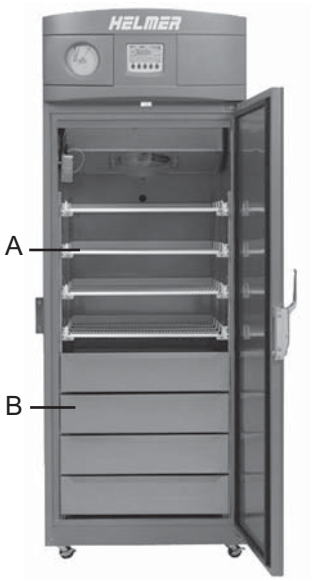
CAUTION To remove the unit cooler cover, follow the instructions in Section 5.1, “Removing and installing the unit cooler cover.” Not following these instructions could result in damage to the drain port on the unit cooler, which may cause operational problems such as excessive icing in the chamber and the inability to maintain the freezer setpoint.



Top left: Unit cooler. Bottom left: Interior of unit cooler, lab controller. Bottom right: Interior of unit cooler, i.Series and Horizon Series controller.

Label	Description	Replacement part numbers	Label on schematic
A	Unit cooler fan blade	220497	-
B	Temperature control probe	i.Center and Horizon: 120495 (probe without connector) Laboratory: 400511-1 (probe with connector)	G
C	Defrost heater limit thermostat	120566	S
D	Fan delay/defrost termination thermostat	Laboratory: 120568	T (Laboratory)
E	Defrost heater (runs length of unit cooler)	120567	R
F	TXV (expansion) valve	320495	-
G	Defrost control probe	i.Center and Horizon: 120495 (probe without connector)	M (i.Center and Horizon)
Not shown	Unit cooler fan motor	120548	H

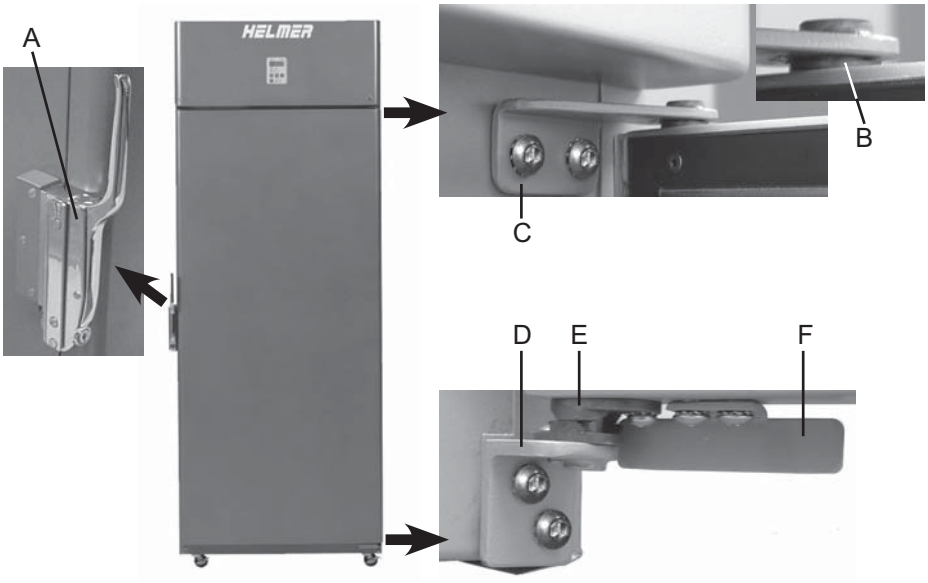
6.4.3 Storage parts



Freezer with full shelves and drawers installed.

Label	Description	Replacement part numbers
A	Full shelf	Includes hardware 120 models: 400414-1 125 models: 400414-2
B	Drawer assembly	Includes drawer, 2 slides, and hardware 120 models: 400584-2 125 models: 400584-1
Not shown	Drawer slide assembly (right side)	120 models: 400541-3 125 models: 400541-1
Not shown	Drawer slide assembly (left side)	120 models: 400541-4 125 models: 400541-2
Not shown	(optional) Roll-out basket assembly	Includes basket, 2 slides, and hardware 120 models: 400890-1 125 models: 400890-2
Not shown	Roll-out basket slide assembly (right side)	120 models: 400541-3 125 models: 400541-1
Not shown	Roll-out basket slide assembly (left side)	120 models: 400541-4 125 models: 400541-2
Not shown	Drawer slide wheel	320815-1
Not shown	Half shelf	Includes hardware 400413-1

6.4.4 Door and hinge parts

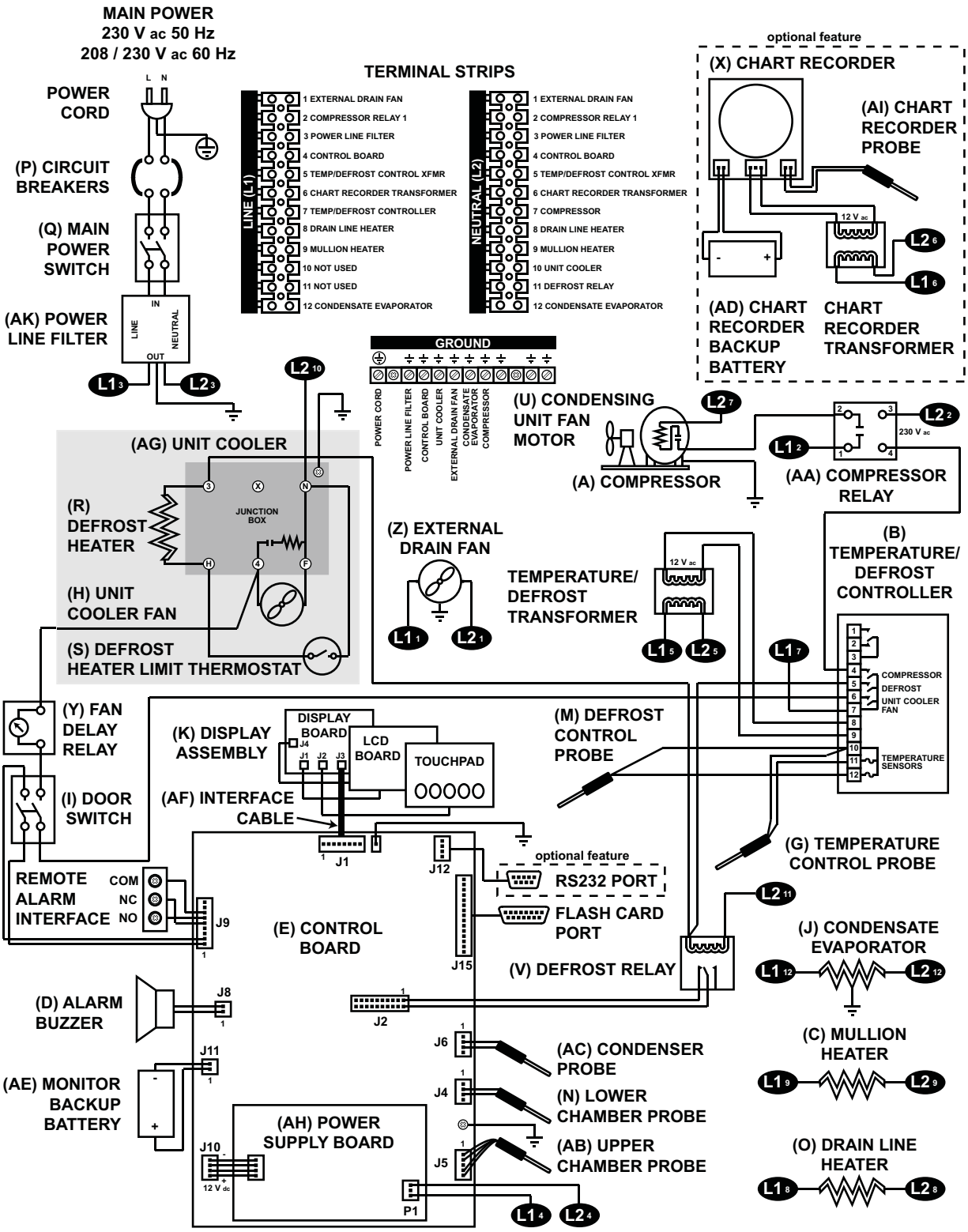


Door and hinge parts

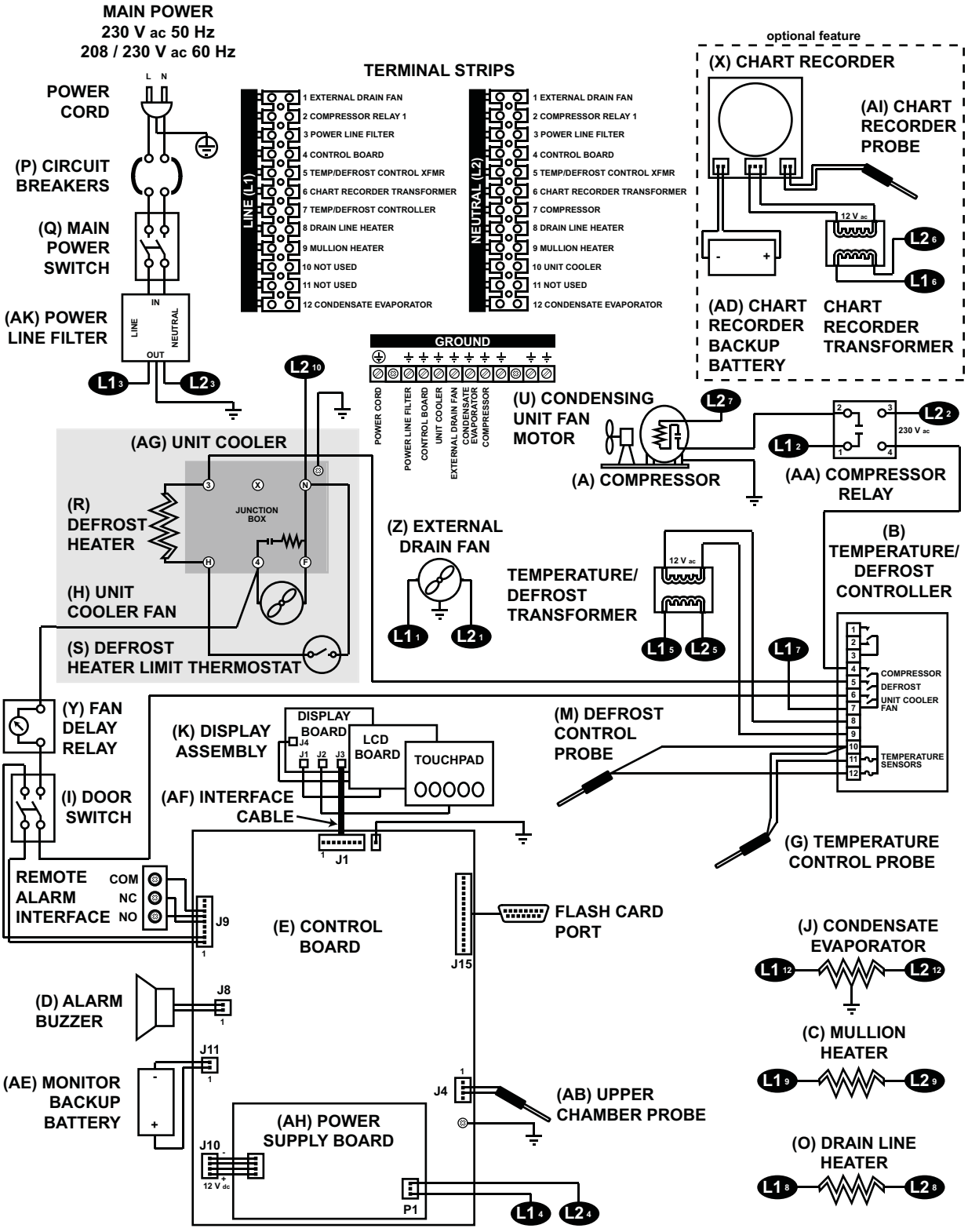
Label	Description	Replacement part numbers
A	Door handle with lock	220426
B	Hinge bearing	220375
C	Upper hinge bracket	Right hinge: 400376-1 Left hinge: 400376-2
D	Lower hinge bracket	Right hinge: 400377-1 Left hinge: 400377-2
E	Hinge cam	320742-1
F	Door stop	320763-1
Not shown	Door lock replacement kit	220439

7 Schematics

7.1 i.Center control system schematic



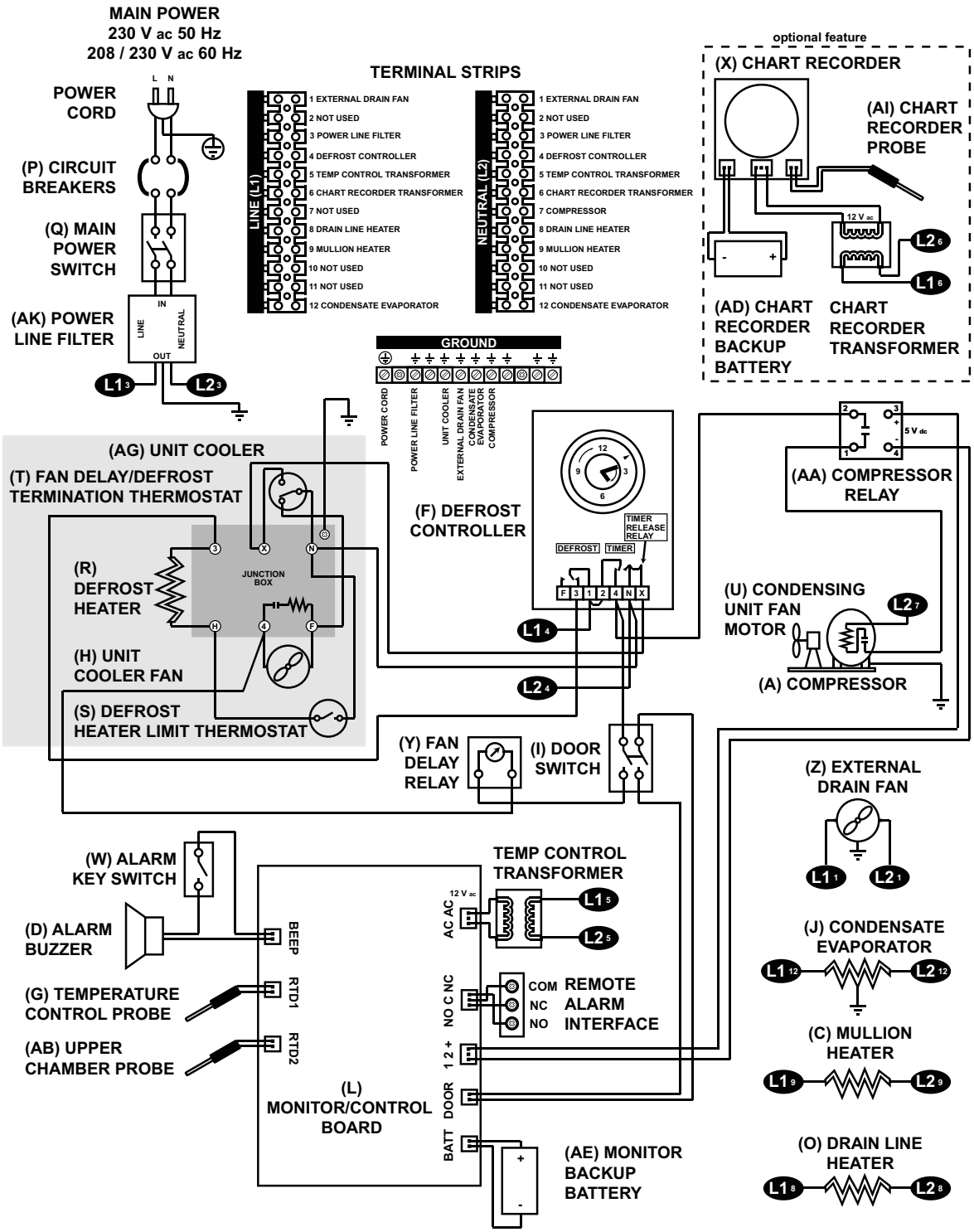
7.2 Horizon control system schematic



7.3 Laboratory control system schematic

NOTE

On the Monitor/Control board, the silkscreened labels for the wiring to the remote alarm interface reflect the state of the relay when the freezer is not receiving power. The labels on the remote alarm interface, however, reflect the state of the relay during normal operation (freezer is receiving power and is not in an alarm state). The wiring for the normally-open and normally-closed terminals may appear to be reversed, but is correct as shown in the schematic.



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